Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] What is claimed is:

1.A method of restoring color of an image, the method comprising:

(a)reading an original image;

(b)performing a white point balancing process on each color channel of the original image;

(c)segmenting the white point balanced image into a plurality of sub-images;

(d)sampling each sub-image to obtain color channel data for each sub-image;

(e)selecting sub-images with a higher standard deviation of color channel data;

(f)analyzing the selected sub-images to calculate a composite color channel mean for each color channel of the white point balanced image;

(g)selecting a first color channel with a highest composite color channel mean, a second color channel with an intermediate composite color channel mean, and a third color channel with a lowest composite color channel mean;

(h)applying a power function on the first and third color channels of all sub-images of the white point balanced

image to approximately equalize the color channel means of the first, second, and third color channels; and (i)outputting a restored image.

[c2] 2.The method of claim 1 wherein step (a) further comprises:
(a1)calculating dimensions of the original image; and
(a2)reading an interior section of the original image to ignore an outside border of the original image.

[c3] 3.The method of claim 1 wherein step (b) further comprises:
(b1)generating a histogram for each color channel of the original image;
(b2)calculating a lower bound and an upper bound based on the histogram corresponding to each color channel of the original image; and
(b3)performing a linear interpolation function to shift a color channel value of each pixel of the original image to be within an interval defined by the lower and upper bounds for each color channel.

[c4] 4.The method of claim 1 wherein step (c) comprises segmenting the white point balanced image into a plurality of sub-images I_{ij}.

[c5] 5.The method of claim 4 wherein step (e) comprises

(e1)calculating a standard deviation S_{ij} of each sub-image I_{ij};

(e2)sorting the standard deviation values S_{ij} into a decreasing sequence S_k

[c6] to form a set

$$T = \{(i,j,k) | S_{k+1} \leq S_k, S_k = S_{ij} \text{ for all } i,j\}$$

; and

[c7] (e3)selecting a subset of sub-images ROI, wherein set $\rho=[c \cdot 3(T)]$, c is a fixed value such that $0<c<1$, and

$$ROI = \{I_{ij} \mid (i,j,k) \text{in } T, S_{ij} > \rho\}$$

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[c8] 6.The method of claim 5 wherein step (e1) further comprises computing a histogram H_{ij} of each sub-image I_{ij} and using the histogram H_{ij} to calculate the standard deviation S_{ij} of each sub-image I_{ij}.

[c9] 7.The method of claim 5 wherein step (f) further comprises computing a mean of

$(I_y \mid I_y \text{ in } ROI)$

for each color channel.

[c10]

[c11] 8.The method of claim 1 wherein in step (h), the power function applied to the first and third color channels is of form $f(x)=x^{1/g}$, wherein x represents color channel data and g is a constant which needs to be determined.

[c12] 9.The method of claim 1 wherein the color channels correspond to red, green, and blue colors.